

CLAIMS

1. An encryption communication system for secret message communication, comprising an encryption transmission apparatus and an encryption reception apparatus, wherein  
5 the encryption transmission apparatus includes:

a storage unit that stores therein one message;

an encryption unit operable to perform an encryption computation on the message a plural number of times, thereby  
10 generating ciphertexts equal in number to the number of times of the encryption computation;

a computation unit operable to perform a one-way operation on the message, thereby generating a comparison computation value; and

15 a transmission unit operable to transmit the ciphertexts and the comparison computation value, and the encryption reception apparatus includes:

a reception unit operable to receive the ciphertexts and the comparison computation value;

20 a decryption unit operable to perform a decryption computation, which corresponds to the encryption computation, on each of the ciphertexts, thereby generating decrypted messages equal in number to the number of the ciphertexts;

25 a computation unit operable to perform the one-way

operation on each of the decrypted messages, thereby generating decryption computation values equal in number to the number of the decrypted messages; and

5 a judging unit operable to compare the decryption computation values with the received comparison computation value, and i) if at least one of the decryption computation values matches the received comparison computation value, output a corresponding decrypted message as a correct decrypted text, and ii) if none of the decryption computation  
10 values matches the received comparison computation value, output a decryption error.

2. The encryption communication system of Claim 1, wherein

15 the encryption computation used by the encryption unit conforms to NTRU cryptosystem, and

the decryption computation used by the decryption unit conforms to the NTRU cryptosystem.

20 3. An encryption transmission apparatus for secret message communication, comprising:

a storage unit that stores therein one message;

an encryption unit operable to perform an encryption computation on the message a plural number of times, thereby  
25 generating ciphertexts equal in number to the number of

times of the encryption computation;

a computation unit operable to perform a one-way operation on the message, thereby generating a comparison computation value; and

5 a transmission unit operable to transmit the ciphertexts and the comparison computation value.

4. The encryption transmission apparatus of Claim 3, wherein

10 the encryption unit comprises:

an encryption computation subunit operable to perform an invertible data conversion on the message thereby generating a converted message, and perform an encryption algorithm on the converted message thereby generating a  
15 ciphertext; and

a repetition control subunit operable to control the encryption computation subunit to repeat the generation of converted message and the generation of ciphertext, the plural number of times.

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5. The encryption transmission apparatus of Claim 4, wherein

the encryption computation subunit generates a random number of fixed length, and generates the converted message  
25 by adding the random number to the message.

6. The encryption transmission apparatus of Claim 5,  
wherein

the encryption algorithm used by the encryption  
computation subunit conforms to NTRU cryptosystem.

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7. An encryption reception apparatus for secret message  
communication, where the encryption transmission apparatus  
stores therein one message, performs an encryption  
computation on the message a plural number of times thereby  
10 generating ciphertexts equal in number to the number of  
the encryption computation, performs a one-way operation  
on the message thereby generating a comparison computation  
value, and transmits the ciphertexts and the comparison  
computation value, the encryption reception apparatus  
15 comprising:

a reception unit operable to receive the ciphertexts  
and the comparison computation value;

a decryption unit operable to perform a decryption  
computation, which corresponds to the encryption  
20 computation, on each of the ciphertexts, thereby generating  
decrypted messages equal in number to the number of the  
ciphertexts;

a computation unit operable to perform the one-way  
operation on each of the decrypted messages, thereby  
25 generating decryption computation values equal in number

to the number of the decrypted messages; and

a judging unit operable to compare the decryption computation values with the received comparison computation value, and i) if at least one of the decryption computation values matches the received comparison computation value, output a corresponding decrypted message as a correct decrypted text, and ii) if none of the decryption computation values matches the received comparison computation value, output a decryption error.

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8. The encryption reception apparatus of Claim 7, wherein the encryption transmission apparatus performs an invertible data conversion on the message thereby generating a converted message, performs an encryption algorithm on the converted message thereby generating a ciphertext, and repeats the generation of converted message and the generation of ciphertext, the plural number of times, and wherein

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the decryption unit comprises:

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a decryption computation subunit operable to perform a decryption algorithm, which corresponds to the encryption algorithm, on a ciphertext thereby generating a decrypted text, and perform an inverse conversion of the invertible data conversion on the decrypted text thereby generating a decrypted message; and

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a repetition control subunit operable to control the decryption computation subunit to repeat the generation of decrypted content and the generation of decrypted message, the plural number of times.

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9. The encryption reception apparatus of Claim 8, wherein the encryption transmission apparatus generates a random number of fixed length, and generates the converted message by adding the random number to the message, and

10 wherein

the decryption computation subunit generates the decrypted message by removing the random number of fixed length from the decrypted content.

15 10. The encryption reception apparatus of Claim 9, wherein the encryption algorithm used by the encryption transmission apparatus conforms to NTRU cryptosystem, and wherein

20 the decryption algorithm used by the decryption computation subunit conforms to the NTRU cryptosystem.

11. An encryption transmission method used in an encryption transmission apparatus that stores therein one message and transmits the message in secrecy, the encryption  
25 transmission method comprising:

an encryption step of performing an encryption computation on the message a plural number of times, thereby generating ciphertexts equal in number to the number of times of the encrypted computation;

5       a computation step of performing a one-way operation on the message, thereby generating a comparison computation value; and

a transmission step of transmitting the ciphertexts and the comparison computation value.

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12. An encryption transmission program used in an encryption transmission apparatus that stores therein one message and transmits the message in secrecy, the encryption transmission program comprising:

15       an encryption step of performing an encryption computation on the message a plural number of times, thereby generating ciphertexts equal in number to the number of times of the encrypted computation;

20       a computation step of performing a one-way operation on the message, thereby generating a comparison computation value; and

a transmission step of transmitting the ciphertexts and the comparison computation value.

25 13. The encryption transmission program of Claim 12, being

recorded in a computer-readable recording medium.

14. An encryption reception method used in an encryption  
reception apparatus that receives a message from an  
5 encryption transmission apparatus in secrecy, where the  
encryption transmission apparatus stores the message  
therein, performs an encryption computation on the message  
a plural number of times thereby generating ciphertexts  
equal in number to the number of times of the encryption  
10 computation, performs a one-way operation on the message  
thereby generating a comparison computation value, and  
transmits the ciphertexts and the comparison computation  
value, the encryption reception method comprising:

a reception step of receiving the ciphertexts and the  
15 comparison computation value;

a decryption step of performing a decryption  
computation, which corresponds to the encryption  
computation, on each of the ciphertexts, thereby generating  
decrypted messages equal in number to the number of the  
20 ciphertexts;

a computation step of performing the one-way operation  
on each of the decrypted messages, thereby generating  
decryption computation values equal in number to the number  
of the decrypted messages; and

25 a judging step of comparing the decryption computation



values with the received comparison computation value, and  
i) if at least one of the decryption computation values  
matches the received comparison computation value,  
outputting a corresponding decrypted message as a correct  
5 decrypted text, and ii) if none of the decryption computation  
values matches the received comparison computation value,  
outputting a decryption error.

15. An encryption reception program used in an encryption  
10 reception apparatus that receives a message from an  
encryption transmission apparatus in secrecy, where the  
encryption transmission apparatus stores the message  
therein, performs an encryption computation on the message  
a plural number of times thereby generating ciphertexts  
15 equal in number to the number of times of the encryption  
computation, performs a one-way operation on the message  
thereby generating a comparison computation value, and  
transmits the ciphertexts and the comparison computation  
value, the encryption reception program comprising:

20 a reception step of receiving the ciphertexts and the  
comparison computation value;

a decryption step of performing a decryption  
computation, which corresponds to the encryption  
computation, on each of the ciphertexts, thereby generating  
25 decrypted messages equal in number to the number of the

ciphertexts;

a computation step of performing the one-way operation on each of the decrypted messages, thereby generating decryption computation values equal in number to the number  
5 of the decrypted messages; and

a judging step of comparing the decryption computation values with the received comparison computation value, and  
i) if at least one of the decryption computation values matches the received comparison computation value,  
10 outputting a corresponding decrypted message as a correct decrypted text, and ii) if none of the decryption computation values matches the received comparison computation value, outputting a decryption error.

15 16. The encryption reception program of Claim 15, being recorded in a computer-readable recording medium.